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Mapping Dialectal Variation Using the Algonquian Linguistic Atlas

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The Algonquian Linguistic Atlas (www.atlas-ling.ca) is an online multimedia linguistic atlas of Algonquian languages in Canada, built based on a template of conversational topics. It includes Algonquian languages primarily from the Cree-Innu-Naskapi continuum, but also from Blackfoot, Mi'kmaw, and Ojibwe (including Algonquin), with other languages in progress. In this paper we discuss how the data collected for the Algonquian Linguistic Atlas was used to conduct a bottom-up study of dialectal boundaries in Cree-Innu-Naskapi and their degree of relatedness to neighboring Algonquian languages. By studying the coincidence of phonological, lexical, grammatical, syntactic, and semantic isoglosses drawn from the Atlas data, we hope to show the research potential coming out of tools developed for pedagogical purposes. This research can in turn further guide the development of new terminology and more pedagogical resources, as well as lead to better understanding of dialectal differences and similarities across the language family.

1. Introduction[1] The Algonquian Linguistic Atlas, a collaborative project started in 2005 (Junker (dir.) 2005–2017), is an online multimedia linguistic atlas of Algo-

[1]We would like to acknowledge the collaborators and speakers involved in the Algonquian Linguistic Atlas project, without whom there would be no reference work to consult. We are grateful to the regional editors: Rand Valentine (Ojibwe), Arok Wolvengrey (Western Cree dialects), Marguerite MacKenzie (Eastern Cree dialects), Inge Genee (Blackfoot), as well as the editorial assistant of the entire atlas, Claire Owen, for watching over the quality and accuracy of the data. For a detailed list of contributors see: http://resources.atlas-ling.ca/media/Microcredits-Atlas-Public.pdf. We would like to thank Delasie Torkornoo for the implementation of the Interactive Dialects Tool, and Stephen Kesselman for his early work getting the tool off the ground. We would also like to thank Will Oxford and David Pentland for thoughtful discussion of the results in this paper. Thanks also to the audience at the Fifth International Conference on Language Documentation and Conservation (ICLDC5) for feedback, as well as to two anonymous reviewers whose comments improved a first version of this paper. Financial support for this work was provided by Canada Research Chair in Language Interactions (awarded to Nicole Rosen), the Vanier Graduate Scholarships and the Martin Kavanagh-Gaultier LaVerendrye Fellowship (awarded to Chantale Cenerini), and the Social Sciences and Humanities Research Council Grant # 435-2014-1199. All errors remain our own.

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nquian languages in Canada, built based on a template of conversational topics, available at www.atlas-ling.ca. It includes Algonquian languages primarily from the Cree-Innu-Naskapi continuum, but also from Mi'kmaw, Ojibwe, Blackfoot, Algonquin, and Michif (and other languages in progress). The project discussed here uses the data collected for the Algonquian Linguistic Atlas to conduct a bottom-up study of dialectal boundaries in Cree-Innu-Naskapi and their degree of relatedness to neighboring Algonquian languages. The primary goal of our research is to investigate linguistic diffusion in the Atlas data, by studying the coincidence of phonological, lexical, grammatical, syntactic, and semantic isoglosses drawn from the Atlas data, and comparing patterns of occurrence and distribution of linguistic items. An understanding of diffusion and dialectal patterns can guide sharing of pedagogical resources and terminology development, as well as lead to better understanding of dialectal differences and similarities across the language family.

Digitized tools, such as electronic atlases, have changed the overall practices in dialectology. They have allowed for more efficient dissemination of data, through the use of interactive interfaces (Olariu & Olariu 2014). Objectives of dialectology have also become diversified and multi-dimensional, considering variation based on factors such as gender, age, socio-economic status and register, in addition to geography (Olariu & Olariu 2014). The Algonquian Linguistic Atlas is a first attempt at modernizing our approach to Algonquian dialectology.[2]

The goal of this paper is to introduce the Interactive Dialectal Maps tool created from the Algonquian Linguistic Atlas, as well as show some examples of the linguistic analysis supported by this tool. The paper is organized as follows: in §2, we provide some background to the Algonquian Linguistic Atlas (Junker (dir.) 2005–2017) and introduce the newly developed Interactive Dialectal Maps tool, a map-generating interface linked to the Atlas data. In §3, we discuss the research potential of the Interactive Dialectal Maps interface, by sharing some of the results of our analysis. In §4, we outline potential applications and directions for future research.

2. Introduction to the Algonquian Linguistic Atlas The director of the Algonquian Linguistic Atlas is Marie-Odile Junker, from Carleton University. Co-directors include Marguerite MacKenzie, Nicole Rosen, J. Randolph Valentine, Arok Wolvengrey and Inge Genee. The project also has many community partners across the country, whose contributions have been invaluable to the project, including: Cree Programs (Cree School Board, Quebec); Institut Tshakapesh; Innu Education Authority; Saskatchewan Cree Retention Committee and the Saskeweskam Learning Centre, Onion Lake; Naskapi Development Corporation; and Conseil de la Nation Atikamekw.

The Algonquian Atlas project, originally named the Cree-Innu Linguistic Atlas, has been expanded to cover not only the Cree-Innu-Naskapi continuum, but neighboring Algonquian languages as well. In §2.1, we explain how the linguistic atlas came about, and we present the languages included so far in the Atlas. In §2.2, we

[2]Although these demographic and social factors are now being recorded, they were not controlled for at the time of interviews and selection of participants for the Atlas.

present a recent innovation in the project, the Interactive Dialectal Maps. Limitations of the project are presented in §2.3. In §2.4, we discuss R as a tool for analysis of variant diffusion in the Atlas data.

2.1 Languages and communities surveyed The Linguistic Atlas (Junker (dir). 2005–2017; Junker & Stewart 2011) is an ongoing documentation project, based on speaker and community requests. It started with a conversation CD and manual for East Cree in 2002 that became popular with neighboring language speakers who wanted to create something similar for their own language. In 2004, an interactive map prototype was developed, intended as a pedagogical tool and a way of connecting linguistically-related communities divided by provincial educational boundaries to share language resources. In 2005, with the advent of Google maps (and successful funding), the atlas was created as an online database with public and administrative interfaces. By 2010, due to increased demand, it grew to include not only the Cree-Innu continuum of languages, but also all Algonquian languages with a community wanting to participate. At that time, the expanded team also designed a supplement to the initial questionnaire, in order to capture specific grammatical features known from previous studies to be relevant for the study of dialectal variation. Languages were surveyed again with this supplement (see Atlas micro-credits: http://resources.atlas-ling.ca/media//Microcredits-Atlas-Public.pdf).

At the time of writing, 47 communities have been fully surveyed, representing 16 languages, 52 speakers, and over 19,000 sound files. Normally one speaker per community is interviewed, but in some cases there are two speakers from the same community. The speaker questionnaire includes elicitation of single words or phrases, pertaining to 21 themes of conversation such as greetings, kinship terms, days of the week, weather terms, social events, location and travel, money, and hunting. The dialectal study presented here accessed the data of 42 communities. The languages studied are given in Table 1, with the full list of communities outlined in the Appendix, along with their language/dialect and nation affiliation.

Although the speech recorded for the Atlas is elicited rather than naturalistic, one of the strengths of the data is that it is consistent across participants, providing researchers with a unique opportunity to work with a corpus of similar primary data across all dialects of Cree-Innu-Naskapi, as well as Ojibwe and Michif, two closely related languages.

2.2 The Interactive Dialect Maps interface A new development in the Algonquian Linguistic Atlas is the conception of a new interactive interface, the Interactive Dialectal Maps Tool (Torkornoo & Junker 2016). This platform allows researchers to access various phonological and lexical variables, coding their respective variants so they can be displayed in an interactive map. For example, word-initial /k/ is a phonological variable considered in the Atlas and has two possible variants: it can either be

[3]Although Blackfoot (from Plains Algonquian sub-family) and Mi'kmaw (Eastern Algonquian) were represented in the Atlas at the time of our analysis, we chose to focus first on Ojibwe and Cree varieties, both Central Algonquian languages and closer relatives linguistically.

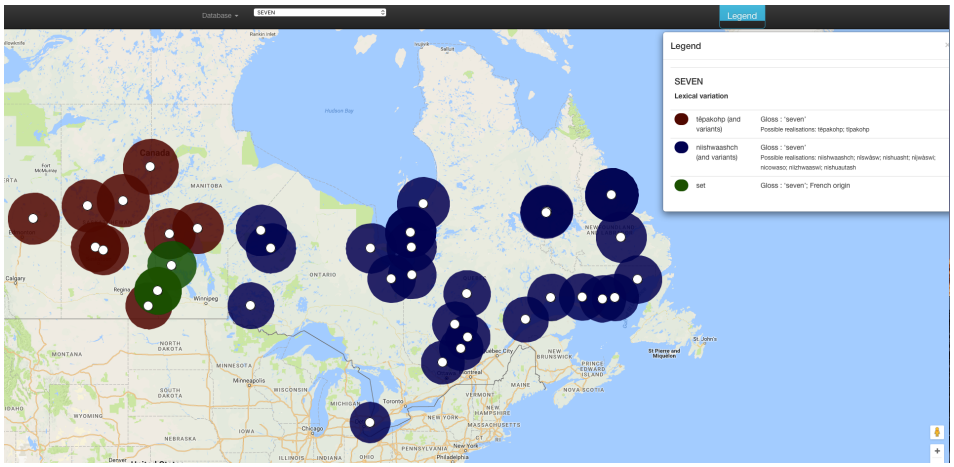
Table 1. Languages, dialects and subdialects represented in Algonquian Linguistic Atlas.

Language	Dialect	ISO 639-3	Subdialects
Blackfoot[3]	Siksiká	[bla]	
Cree-Innu-Naskapi continuum	Michif	[crg]	
	Métis Cree	-	
	Plains Cree	[crk]	Northern Plains Cree
			Southern Plains Cree
	Woodland Cree	[cwd]	Northern Woodland Cree
			Southern Woodland Cree
	Swampy Cree	[csw]	Western Swampy Cree
			Eastern Swampy Cree
	Moose Cree	[crm]	
	Atikamekw	[atj]	Opiticiwon
			Wemotaci-Manawan
	East Cree	[crl]	Northern East Cree
		[crj]	Southern coastal East Cree
			Southern inland East Cree
	Innu	[moe]	Western Innu
			Central Innu
			Eastern Innu
			Mushuau Innu / Eastern Naskapi
	Naskapi	[nsk]	Western Naskapi
Eastern Algonquian	Mi'kmaw	[mic]	
Ojibwe	Oji-Cree	[ojs]	
	Western Ojibwe	[ojw]	
	Odawa (Nishnaabemwin)	[otw]	
	Algonquin	[alq]	

realized as [k], as in Western Cree varieties, or palatalized as [tʃ] in Eastern varieties. This division is laid out clearly in the corresponding interactive map.

Furthermore, sound files from the Algonquian Atlas can be tagged in the interface to a variant and corresponding variable. These points of data are subsequently linked and plotted onto a Google map. Colored 150 km-radius circles surround each data point in order to illustrate more clearly the language boundaries delimited by variant use. An example of a map generated in the interface for the lexical variable 'seven', with its three variants *têpakohp*, *niishwaashch*, and *set*, is shown here for illustrative purposes:

Map 1. Example of map generated through the Interactive Dialectal Maps interface.



Map 1 clearly shows an isogloss boundary corresponding to the Manitoba-Ontario provincial border for the two main variants for 'seven', namely *têpakohp*, attested west of the border, and *niishwaashch*, attested in the east. This visualization makes the Interactive Dialectal Maps a valuable tool for linguistic analysis of Atlas data as well as for assessing and identifying recurring patterns and boundaries across the Cree-Innu-Naskapi continuum and related languages.

2.3 Limitations of the project There are some limitations to the project with respect to linguistic analysis: it is impossible to claim that the forms collected are representative of the entire community's speech patterns, as they may be simply a reflection of the individual speakers interviewed in each community. Note that this was also a significant limitation of traditional dialectological work, where researchers usually interviewed only one NORM (non-mobile older rural male) per surveyed community (Chambers & Trudgill 1998:47). Therefore we proceed with the caveat that the data gathered in the Algonquian Linguistic Atlas is not exhaustive.

Aurrekoetxea & Perea (2009) show that there are multiple possible responses to a questionnaire: firstly, elicitation might consist of single-answer questions, for which participants readily volunteer the correct response. Participants might also provide alternate responses with which they are familiar but do not use themselves, or even give a single answer while unconsciously using another solution in spontaneous speech. Finally, they might also hesitate between standard and vernacular forms. It is also possible that, for example in the case of verbal inflection, depending on the elicitations, speakers were constrained to making contrasts in the language that are not normally made. In addition, specific to our case, concepts such as "underneath", "below", and "down" that were elicited as part of the questionnaire are often connected to specific physical features in Algonquian (such as water, etc.) and as such might trigger variation[4]. That said, the consistency of the manner in which the data

[4]Thank you to an anonymous reviewer for pointing out this fact.

was gathered offers us an invaluable opportunity to give a broad overview of Cree-Innu-Nasakpi and related languages' dialectology in order to challenge or confirm findings put forth in previous, smaller-scale or more fine-grained studies (cf. Béland 1978; Drapeau 1979; Pentland 1979; Voorhis 1981; MacKenzie 1980; McGregor 1994; Valentine 1994). Our research shows that despite the fact that the Atlas was not specifically designed as a tool for linguistic analysis, the analyses stemming from the Atlas data generally correspond to those from other previous studies, suggesting that the Algonquian Linguistic Atlas can be a useful tool for linguistic research. Furthermore, the Atlas provides high-quality recordings of hundreds of items per speaker, of both individual words and entire sentences, all of which have been carefully transcribed and plotted on a map. This is also the first study to cross language boundaries, such as that between Cree and Ojibwe.

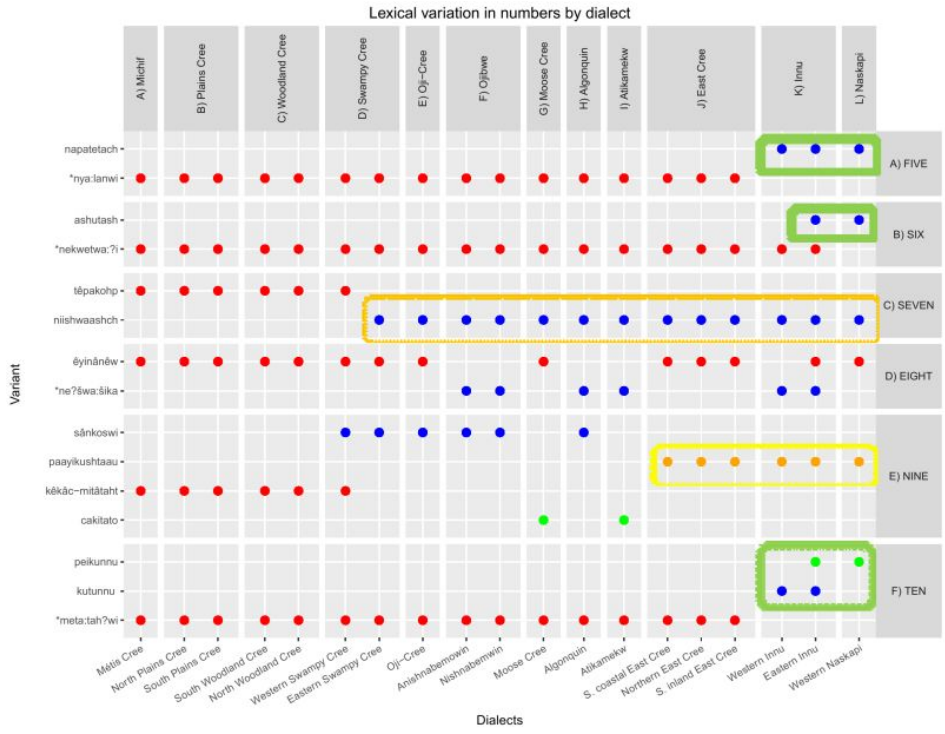
2.4 R as a tool for analysis Packages in the software R (R Core Team 2016) such as ggplot2 (Wikham 2009), dplyr (Wikham et al. 2016), and igraph (Csárdi & Nepusz 2006) were used in order to compile isoglosses and patterns identified in the Interactive Dialectal Maps in cumulative geographical maps, dot plots, and network graphs. Using these tools, we have been able to create visually striking representations of the distribution of variants, which in turn has allowed us to assess the weight of the isogloss bundles, their content, and their overall significance.

For example, the dot plot in Table 2 summarizes and compares the distribution of lexical variants for numbers five to ten. A few patterns emerge from this table, for example the distinctiveness of Innu and Naskapi in the lexical items 'five', 'six', and 'ten' (dots representing these dialects are circled in green), as well as a boundary between dialects which palatalize word-initial /k/ and those who do not in the variable 'nine' (dots representing palatalized dialects circled in yellow) and at the Manitoba-Ontario provincial border for the variable 'seven' (dots representing communities east of the provincial border circled in orange). The dot plots can be used as well to compile all variants which exhibit similar diffusion patterns, as we will see in §3.

The maps generated in R offer a visual of how many variants communities have in common, by the gradual change of size and color of dots plotted at each community's coordinates. For the purposes of illustrating the potential of these maps for linguistic analysis and pedagogical outcomes, we analyzed lexical variation, considering 42 lexical variants. Particular dialectal groups were then chosen as a focal point, and variants attested in the dialect group of interest were entered into an Excel spreadsheet. If communities shared a variant with said group, they received a value of 1. The sum of their points was representative of how many variants were shared between communities and the focal point. An example is shown in Map 2. The community of interest here is Beauval, a North Plains Cree community in northern Saskatchewan, near the most western points on the map, and represented by the yellow dot. The color of the dots darkens and their size decreases as the communities they represent share less and less with Beauval.

These visualisations in R complement maps generated through the Interactive Dialect Maps interface, which in turn show the distributional patterns of the linguistic

Table 2. Example of dot plot generated in R.

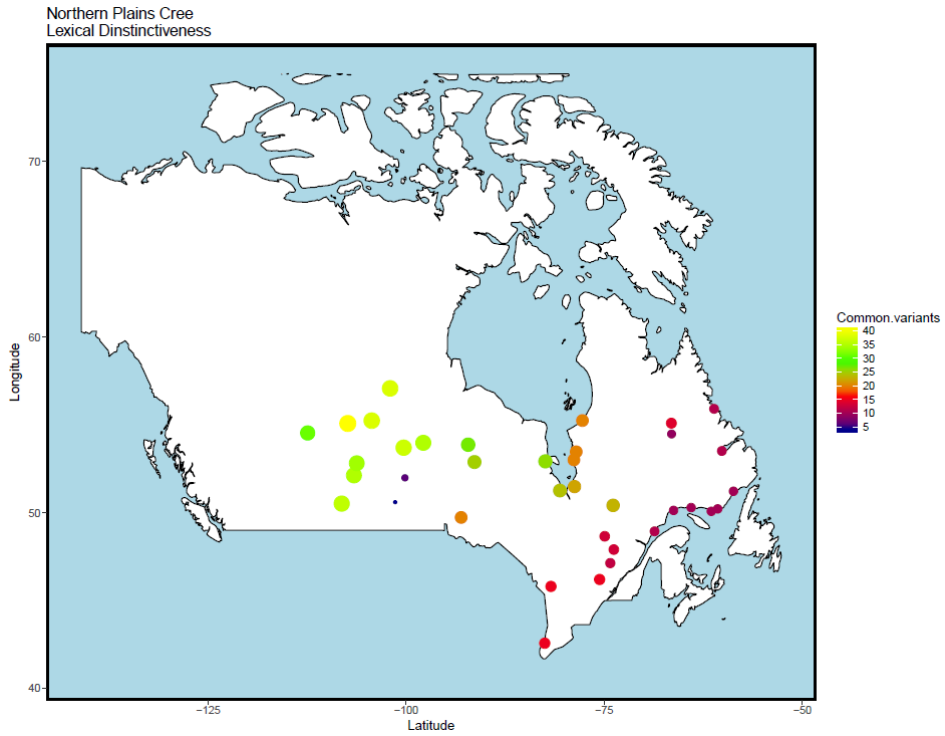


variants. Together, they provide a clear visual illustrating the complex relationship between Cree-Innu-Naskapi dialects, and their degree of relatedness to neighboring languages. The use of shape and color, and the potential for interactivity, allow for digital maps to be more visually striking and informative than their traditional counterparts. The maps created to showcase lexical variation could furthermore be easily applied to phonological and grammatical variation, both of which are available in the Atlas data.

3. The Research on Dialectal Variation The data available in the Atlas allows for a bottom-up study of the Cree-Innu-Naskapi continuum, considering different types of variables. Overall, 110 variables, namely 10 phonological, 73 lexical, and 27 grammatical, were inputted in the Interactive Dialectal Maps. Some of the variables have been previously studied (cf. Voorhis 1981; Pentland 1979; MacKenzie 1980; McGregor 1994; Béland 1978; Drapeau 1979; Valentine 1994), allowing for comparison between methods and points of time. We discuss three patterns and isogloss bundles of particular interest here.

We outline here some of the research that has come out of our bottom-up analysis. In §3.1, we outline a smaller, albeit significant, isogloss bundle, which coincides with the Manitoba-Ontario provincial border. In §3.2, we explore the advantages of an equally consistent corpus of data across the continuum. By conducting a large-scale

Map 2. Example of map generated in R.



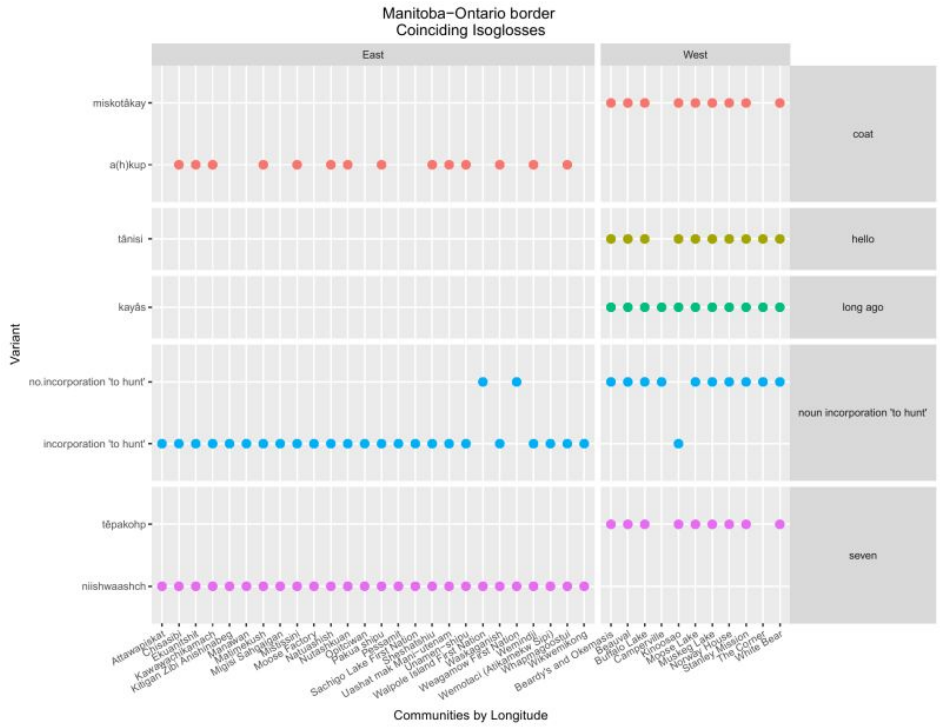
comparison of palatalized and non-palatalized dialects, we have gained insight into the question of the affiliation of East Cree. Finally, in §3.3, we discuss patterns linked to language contact and borrowing, including the distinctiveness of Atikamekw from other Cree-Innu-Naskapi dialects and its close relationship to Ojibwe. We propose that the most appropriate way to describe the relationship between Western Cree, Innu, Atikamekw, Naskapi, Ojibwe, and Michif dialects is as a three-point web rather than a straight-line continuum.

3.1 The Manitoba-Ontario isogloss bundle One of the recurrent patterns to have emerged in our research is an isogloss bundle which coincides with the provincial border between Manitoba and Ontario, a political border which also reflects the geological transition from the Prairies in the West to the Canadian Shield in the East. The bundle consists of one grammatical and four lexical isoglosses, as shown in Table 3. In cases where there is no dot in the graph, another variant not considered here was provided.

In the case of the variable 'coat', the variant *a(h)kup* is exclusively found in dialects east of the border,[5] while *miskotâkay* is only documented in the west. Similarly, *niishwaashch* for 'seven' is attested in eastern dialects and *têpahkohp* is only found in

[5]When found in the west, *a(h)kup* usually refers to 'blanket', not 'coat'. It also undergoes metathesis in East Cree dialects, realized as *apuk* rather than *akup*.

Table 3. Isogloss bundle at the Manitoba-Ontario border.



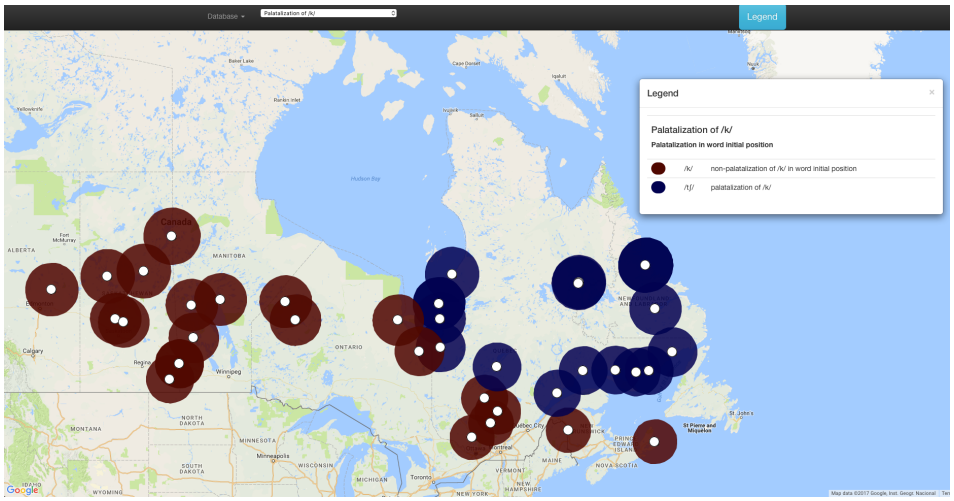
western dialects. Furthermore, speakers surveyed east of the boundary used noun incorporation for the verb 'to hunt (animal)', while none did in the west, with the exception of the speaker from the Woodland community of Kinoosao.[6] Furthermore, *tânisi* 'hello, how are you' and *kayâs* 'long ago' was also found exclusively in the data for the dialects west of Ontario.

3.2 The affiliation of East Cree The broad scope of the Algonquian Atlas project allows us to consider the cohesiveness of language varieties across the full Cree-Innu-Naskapi continuum on phonological, lexical, and grammatical levels. For example, it has allowed us to gain insight on the affiliation of East Cree, a dialect which shares distinctive properties with both eastern and western varieties of Cree-Innu-Naskapi, adding nuance to the idea that the division between dialects which palatalize word-initial velar /k/ and those who do not (corresponding roughly with the southern edge of James Bay) comprises one of the major breaks along the continuum.

This division is evident in Map 3. Communities which palatalize word-initial /k/ are represented by purple circles, while communities which do not are in green. In the Innu community of Pessamit, both palatalization and affrication are possible, according to Atlas data.

[6]Baraby et al. (2002) report on the loss of incorporation for younger bilingual speakers. It would be interesting to see if this feature correlates with language vitality and cultural changes.

Map 3. Word-initial palatalization of /k/.



Our findings, supporting MacKenzie's (1980) conclusions, show that there is an isogloss bundle coinciding with this phonological distinction. A summary of the results can be found in Table 4.

Table 4. Isogloss bundles between palatalized and non-palatalized dialects.

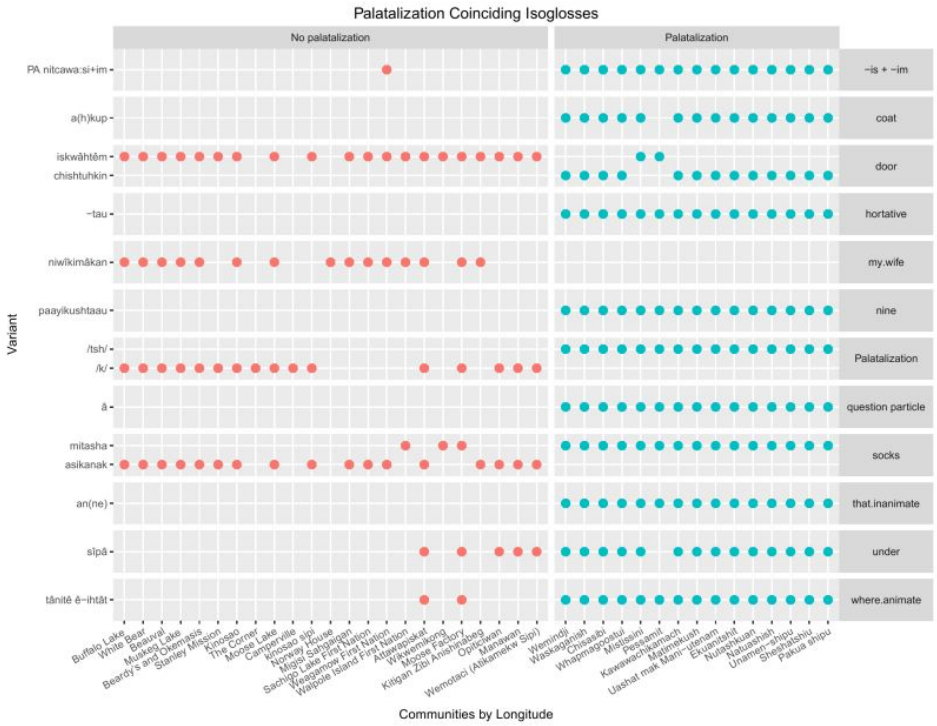


Table 4 shows that the isogloss bundle between palatalized and non-palatalized dialects contains many lexical isoglosses (i.e., 'coat', 'door', 'my wife', 'nine', 'socks', and 'under'), as well as grammatical isoglosses including the hortative,[7] the yes/no question interrogative particle, and the use of the interrogative phrase *tânitê ê-itâht* to locate animate referents.

For example, for the variable 'nine', all palatalized varieties use a version of *paayikushtaau*, with the root *paayik-* 'one', with a great deal of variation in the west. Furthermore, the variant *ahkup* for 'coat' is only attested in the palatalized dialects, with the exception of Pessamit. The distribution of the variants for 'door' also corresponds to the boundary between palatalized and non-palatalized dialects: versions of *chishtuhkin* seem to be favored in palatalized dialects, with the exception of the East Cree community of Mistassini, which provides a version of *iskwâhtêm*, the variant favored in non-palatalized dialects. Both variants are also attested in Pessamit. With a few exceptions (i.e., Moose Cree, Odawa, and Western Naskapi), speakers of palatalized dialects provide a version of *mitasha* for 'socks', while *asikanak* is favored by speakers of non-palatalized dialects. In the case of the variable 'under', there is considerable variation: although the variant *sîpa* is attested across the Cree-Innu-Naskapi continuum, *sêkoc* and *atâmihk* are only attested in non-palatalized dialects.

Furthermore, there is grammatical cohesiveness in palatalized dialects: all speakers of palatalized dialects provided the hortative suffix *-tau*; the variant *an(ne)* for the inanimate demonstrative 'that' occurs consistently in palatalized dialects (as well as in Blackfoot in the west); and the interrogative particle *â* occurs consistently in palatalized dialects. Finally, when the particle 'where' is used to locate an animate referent, speakers of palatalized dialects, as well as those from Moose Factory and Attawapiskat, use the conjunct verb *ê-ihtât* in conjunction with *tânitê*, as in *tânitê ê-ihtât* (animate referent).

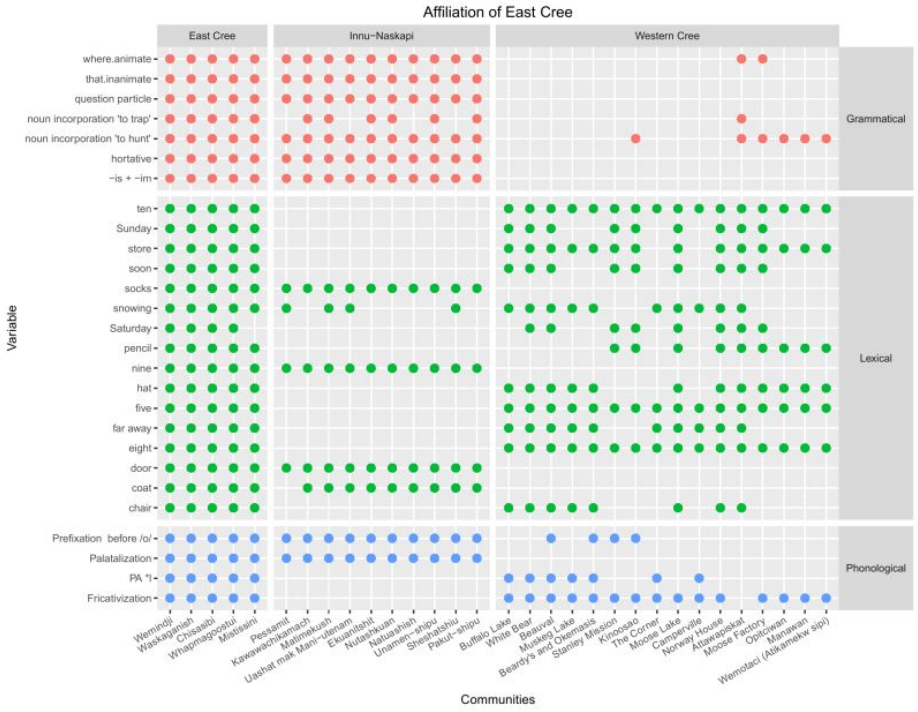
Thus, the table shows that the distribution of innovations originating in palatalized dialects halts at the palatalization boundary more often than that of innovations originating in the non-palatalized dialects. There is, as a result, more distinctive cohesiveness within palatalized dialects than within non-palatalized ones. The fact that there are isoglosses on different structural levels indicates the extent of the break between palatalized and non-palatalized dialects. In other words, phonological and lexical isoglosses, often considered to be superficial differences (Chambers & Trudgill 1998:96–99), are supported by deeper-level grammatical isoglosses.

Furthermore, there is some contention regarding the affiliation of East Cree and whether it is more closely related to Innu and Naskapi, other palatalized dialects, or to non-palatalized Western Cree dialects. Wolfart (1973) and Pentland (1979), who work primarily on non-palatalized dialects, use the term Cree in a narrow sense, i.e., west of the Ontario-Québec border, thus excluding palatalized dialects (MacKenzie 1980). However, MacKenzie (1980), studying primarily palatalized dialects, refers to dialects of James Bay and Mistassini as Cree or Naskapi, rather than as Innu.

[7]The hortative is to encourage or urge a group including the Speaker to act, expressed as *let's …* in English, as in 'let's dance'.

The data from the Atlas shows that, in fact, East Cree dialects seem to share more in common *lexically* with Western Cree than with other palatalized dialects. However, East Cree dialects share more in common *grammatically* with palatalized dialects. A summary of the lexical and grammatical isogloss bundles, showing East Cree's affiliation with Western Cree and palatalized dialects respectively, is shown in Table 5. Grammatical variables are represented in pink; lexical variables, in green; and phonological variables, in blue.

Table 5. The Affiliation of East Cree.



Chambers & Trudgill (1998:96–99) characterize phonological and lexical isoglosses as most superficial, because they are the most available by the speaker at a conscious level. Morphological and syntactic isoglosses, on the other hand, are considered to be deeper, at a subconscious level, and consequently, to be more permanent variation. Morphological and syntactic isoglosses can be seen then to be more meaningful indicators of variation. Our data seems to indicate that although *superficially* East Cree has more in common with Western Cree dialects, it is *structurally* closer to palatalized dialects. We can therefore conclude that the idea of a continuum, with East Cree considered a "transitional" zone, is important to the understanding of Cree-Innu-Naskapi dialectology.

The phonological variables outlined in the table, namely the reflexes of Proto-Algonquian phoneme **r*, neutralization of /ʃ/ and /s/, palatalization of word-initial /k/, and the prefixation of second person prefix *ki-* before a verb stem beginning in /o/, show a split. In the case of a few variants, East Cree falls in line with Western Cree,

while in others, it corresponds to Innu and Naskapi. For example, both East Cree and Plains Cree share the reflex /y/ for Proto-Algonquian **r*, and Proto-Algonquian /s/ and /ʃ/ are merged as /s/ in East Cree and Plains, Swampy, and Woodland Cree dialects, while East Cree, Innu, and Naskapi all palatalize initial /k/ and contract the prefix *ki-* or *tshi-* as *k-* or *tsh-* before a stem beginning in /u/, as in this example of East Cree from the Atlas:

(1) *kuushuuyaanimin aa?*
k-uushuuyanimi-n aa
2-have.money-2.SG Q
'Do you have money?'

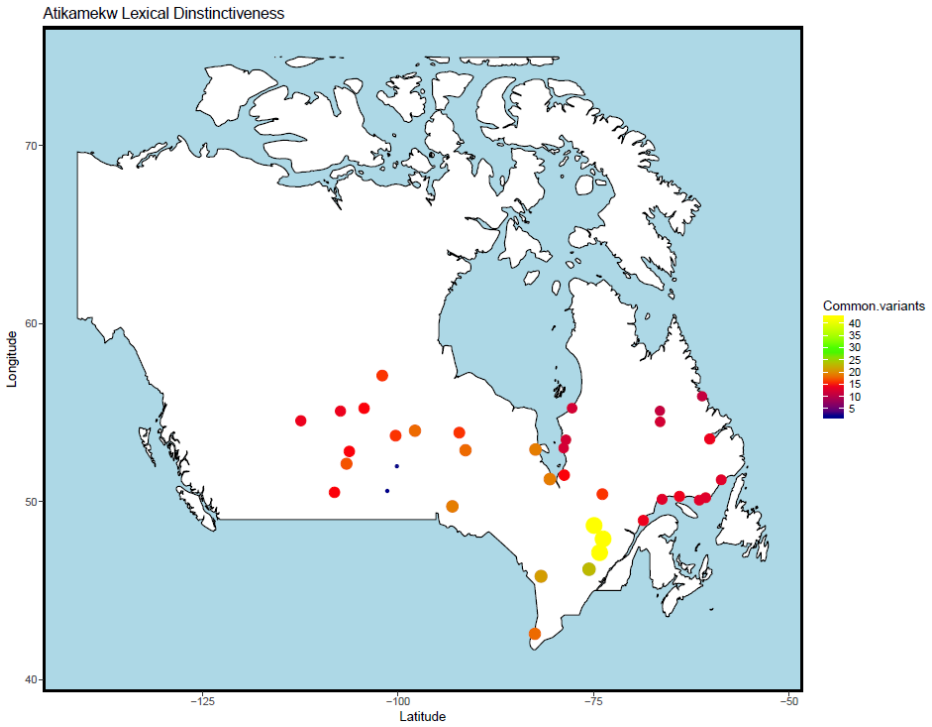
Some Western varieties, rather than contracting, epenthesize the consonant /t/ between second person suffix *ki-* or *tshi-*.

3.3 The distinctiveness of Atikamekw We also considered effects of language contact and borrowing across the Cree-Innu-Naskapi continuum and related languages. One such case concerns Atikamekw, where we found that one of the most significant isogloss bundles arising from the data is one which separates Atikamekw from other dialects of the Cree-Innu-Naskapi continuum, a generalization also brought forth by MacKenzie (1980). Lexically, the closest dialect to the Atikamekw group is in fact not a Cree dialect, but the Algonquin language of Kitigan Zibi. The results are shown in Map 5, where the three Atikamekw communities Manawan, Opitciwan, and Wemotaci are the baseline, represented by the yellow dots. This map offers a visual of how many variants communities surveyed in the atlas have in common with the Atikamekw group, by the gradual change of size and color of dots plotted at each community's coordinates. In addition to Algonquin, the Atikamekw group also shares many variants with Anishnabemowin-related dialects, namely Oji-Cree, Ojibwe, and Odawa (Nishnaabemwin) (Map 5). In fact, there are variants in our corpus which are found only in dialects of Atikamekw and Ojibwe.

Atikamekw was identified as a dialect of Cree by Michelson in 1933, using Cooper's linguistic material (Béland 1978). Before this, Atikamekw was actually classified as a mix of Ojibwe and Cree (Quaife 1921 in Béland 1978) or as an Algonquin-Ojibwe dialect (Davidson 1928 in Béland 1978). However, phonologically and grammatically, Atikamekw is clearly a Cree dialect. For example, it has a fully developed relational paradigm (Béland 1978): while attested in some Ojibwe varieties, the relational inflection (which marks the presence of a third person which is neither the actor nor the goal, but with whom the speaker associates, i.e. feels empathy for) is understood to be a Cree innovation and peculiarity among Algonquian languages (Bloomfield 1928; Béland 1978; Junker 2003; Cenerini 2014).

Our analysis reflects the fact that, in cases where Atikamekw is lexically distinct from other Cree dialects, it has often borrowed from Ojibwe dialects. This is perhaps at the root of older classifications of Atikamekw as a dialect of Ojibwe.

Map 5. Lexical distinctiveness of the Atikamekw group

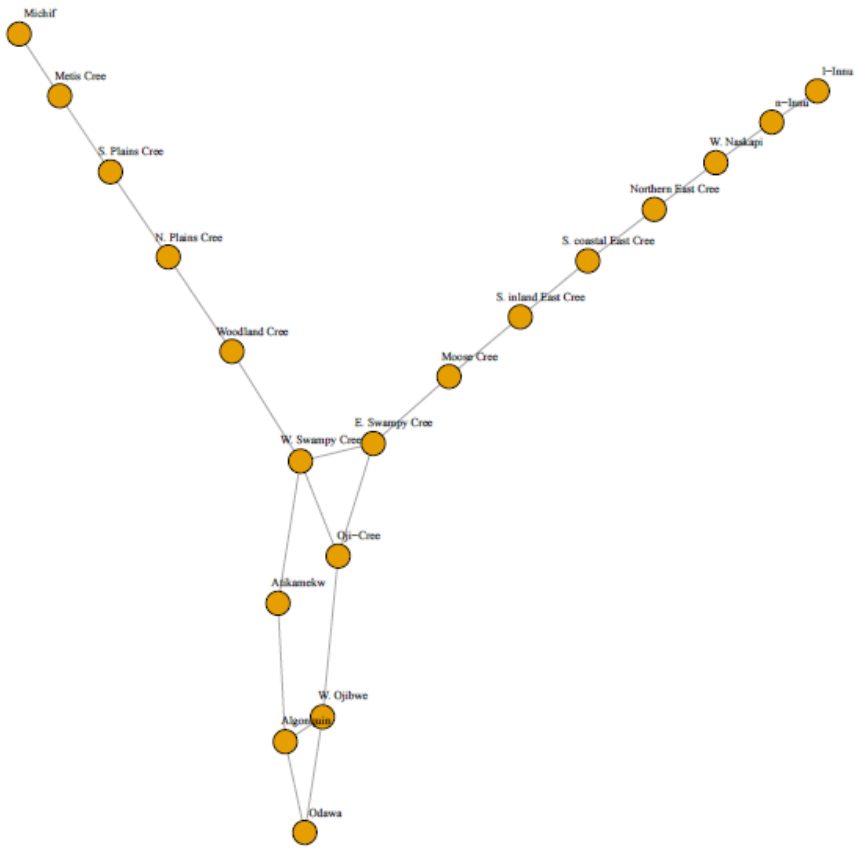


Our findings suggest then that the most appropriate way to describe the complex relationship between Western Cree, Innu, Atikamekw, Naskapi, Ojibwe, and Michif dialects is as a three-point web, to which we could potentially add other Algonquian languages, rather than as part of a linear continuum. We argue that this novel way of viewing the Cree-Innu-Naskapi continuum, based on the number of analyzed commonalities the surveyed dialects share with one another, is the best way to illustrate the languages' relationships to each other, based on key findings of our research. Such a web allows us to consider the kinds of influence Cree and Ojibwe languages have had on each other, and the impact of occupying overlapping and adjacent territories on phonological, lexical, and grammatical variation across these genetically distinct communities. For example, it acknowledges the lexical influence of Ojibwe varieties on Atikamekw in particular, and Atikamekw's differences from neighboring palatalized varieties.

At the end of the web's first branch we find Michif, a language in which most nominals are of French origin, followed by Métis Cree and Western Cree dialects. At the end of the second branch, we find Odawa and other Ojibwe dialects, to which Oji-Cree and Atikamekw are the closest relatives. Finally, at the end of the third branch, we find the Innu *l*-dialect (from Pessamit) and other palatalized dialects.

All three branches of the web converge at the distinction between Eastern and Western Swampy Cree and Oji-Cree. This convergence corresponds to the provincial border between Ontario and Manitoba, where there is a significant isogloss bundle.

Table 6. Cree-Innu-Naskapi, Michif, and Ojibwe web of influence



The break between Moose Cree and southern inland Cree corresponds to the division between palatalized and non-palatalized dialects. Atikamekw is set apart from the other Cree-Innu-Naskapi dialects, its closest lexical relatives being Algonquin and Western Swampy Cree.

4. Conclusions We have described the newest technical development in the Algonquian Linguistic Atlas project, namely the Interactive Dialectal Maps tool, an interface which allows for the analysis of existing Atlas data to create isogloss maps of various lexical, phonological, and grammatical variables. We have shown how the Atlas, originally conceived of for documentary and pedagogical reasons, can be exploited with implications for the study of dialectal variation. One particular value this method has over previous studies is its inclusion of many languages that, while genetically distinct, have occupied overlapping and adjacent territories, and thus have influenced each other. Our method allows us to observe the different kinds of influ-

ence Cree and Ojibwe dialects have had on each other.[8] We have further shown how linguistic analysis of this existing data can offer unique insights into questions that have arisen in the study of Algonquian dialect variation.

One of the heaviest isogloss bundles found in our data marks Atikamekw as a phonologically and lexically distinct dialect. In fact, Atikamekw has more in common lexically with Ojibwe dialects than with neighboring Cree dialects. Furthermore, our findings show important isogloss bundles at the Manitoba-Ontario border and the Ontario-Québec border, the latter coinciding with the distinction between palatalized and non-palatalized dialects. They also show that the division between palatalized and non-palatalized dialects is not a clean break, and that East Cree shares distinctive features with both Western Cree and other palatalized varieties.

A language web illustrates the intricacies of language interactions between the Cree-Innu-Naskapi varieties and related languages, such as Western Ojibwe, Odawa, Algonquin, and Oji-Cree. This web could be extended to include more languages, as well as morpho-syntactic or grammatical variation, to assess whether the layout of the web remains more or less the same.

One of the more practical applications of the dialectal work presented here concerns terminology development for Indigenous communities we work with. A number of terminology development projects have been underway in areas of health care and justice, in order to provide speakers of these languages better access to government funded services.[9] Some of these are compiled in a database that is part of the linguistic atlas (see terminology.atlas-ling.ca). Developing terminology can be time-consuming and costly. Access to terminology already developed by neighboring or linguistically related groups can speed up this process. The dialectal work presented here, as well as future work in this area, can help guide groups in sourcing their inspiration for new words.

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[8]We would like to thank an anonymous reviewer for pointing this out.

[9]See for example the work by MacKenzie et al. (2007–2014) and Neacappo et al. (2017).

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Appendix

Communities represented in the Algonquian Linguistic Atlas[10]

Language/ Language Group	Language/ Dialect	Subdialects	Communities	Nation Affiliation	Prov.
Blackfoot	Siksiká		Siksiká	Blackfoot First Nation	AB
Cree-Innu-Naskapi continuum	Plains Cree	Northern Plains Cree	Beauval		
		Southern Plains Cree	Muskeg Lake	Muskeg Lake Cree Nation	SK
			Beardy's and Okemasis	Beardy's and Okemasis First Nation	SK
			White Bear	White Bear First Nations	SK
	Woodland Cree	Northern Woodland Cree	Kinosao	Peter Ballantyne First Nation	SK
			Southend		
		Southern Woodland Cree	Stanley Mission	Lac La Ronge Indian Band	SK
	Métis Cree		Buffalo Lake	Buffalo Lake Métis Settlement	AB
	Michif		The Corner	Métis Nation	MB
			Camperville		
	Swampy Cree	Western Swampy Cree	Cumberland House	Cumberland House Cree Nation	SK
			Moose Lake	Mosakahiken Cree Nation	MB
			Norway House	Norway House Cree Nation	MB
		Eastern Swampy Cree	Attawapiskat	Attawapiskat First Nation	ON
	Moose Cree		Moose Factory	Moose Cree Nation	ON
	Atikamekw	Opiticiwon	Opiticiwan	Atikamekw Nation	QC
		Wemotaci-Manawan	Wemotaci		
			Manawan		
	East Cree	Northern East Cree	Whapmagoostui	Whapmagoostui First Nation	QC
			Chisasibi	Cree Nation of Chisasibi	QC
			Wemindji	Cree Nation of Wemindji	QC
		Southern coastal East Cree	Waskaganish	Waskaganish First Nation	QC
		Southern inland East Cree	Mistissini	Cree Nation of Mistissini	QC
	Innu	Western Innu	Pessamit (Betsiamites)	Innus de Pessamit	QC
		Central Innu	Uashat (Sept-Iles)	Innu Takuaikan Uashat mak Mani-utenam	QC
			Mani-utenam (Moisie)		
			Matimekush (Shefferville)	Nation innue Matimekush-Lac-John	QC
		Eastern Innu	Ekuanitshit (Mingan)	Conseil tribal Mamit Innuat	QC
			Nutashkuan		
			Unamen-shipu (La Romaine)		
			Pakut shipu (St Augustin)		
			Sheshatshiu	Sheshatshiu Innu First Nation	LAB
		Mushuau Innu / Eastern Naskapi	Natuashish (moved from Davis Inlet in 2002)	Mushuau Innu First Nation	LAB
	Naskapi	Western Naskapi	Kawawachikamach	Naskapi Nation of Kawawachikamach	QC
Mik'maw			Maupeltu (Membertou)	Mi'kmaw Nation	NS

Continued from previous page

Language/ Language Group	Language/ Dialect	Subdialects	Communities	Nation Affiliation	Prov.
Ojibwe	Oji-Cree		Weagamow First Nation	Windigo First Nation Council Nishnawbe Aski Nation	ON
			Sachigo Lake First Nation	Windigo First Nation Council	ON
	Western Ojibwe		Migisi Sahgaigan	Eagle Lake First Nation	ON
	Odawa		Walpole Island First Nation	Bkejwanong Territory	ON
			Wikwemikong	Wikwemikong Unceded Indian Reserve	ON
	Algonquin		Kitigan Zibi Anishinabeg	Algonquin First Nation	QC

[10]Language documentation in the Atlas is ongoing. This list includes only the languages represented in the Atlas at the time of the study.